



Medical School Hotline

The Hyperbaric Treatment Center John A. Burns School of Medicine Frank P. Farm, Jr., Director

The Hyperbaric Treatment Center (HTC) at Kuakini Medical Center is a vital service that meets the needs of SCUBA divers not only in the State of Hawaii but throughout the Pacific. The center is one of the University of Hawaii John A. Burns School of Medicine (JABSOM) direct links to the community which provides essential patient care. HTC also provides training for residents in a unique field of medicine. These residents learn to treat decompression illnesses (DCI) and to administer Hyperbaric Oxygen Treatments (HBO) for a broad range of ailments. HTC not only meets the needs of divers and teaches physicians the clinical skills needed to treat DCI but also offers the Medical School opportunities for research.

Hyperbaric Medicine was first used in the 19th century, when compressed air was used to help facilitate the construction of tunnels and bridge piers. This new technology was later adopted by the medical community to hyperoxygenate the blood. Hyperbaric Oxygen has continued to evolve since the 19th century into a research based tool, not only to treat Decompression Sickness but also for other medical problems.

During the early 1980's the then governor of the State of Hawaii, George Ariyoshi, was notified by the US Navy (USN) that they could no longer provide humanitarian treatment of civilian divers. The Navy had provided this care for divers in the State since the introduction of self contained underwater breathing apparatus (SCUBA) gear in the early 1950's. The Governor identified JABSOM as a source of expert medical advisors and requested that the School provide him with an opinion on the most prudent course of action to provide for care to injured divers.

The Dean of the School of Medicine convened a group of interested faculty members and appointed the Chairman and Professor of Pathology, Dr. John Hardman, to lead the group. The Committee produced an extensive report informally titled as the Hardman Report. It provided recommendations on the establishment of a center, the equipment that should be purchased, and other details. With that effort, the foundation for the involvement of the John A. Burns School of Medicine with the Hyperbaric Treatment Center was established.

The most important and critical contribution that the School of Medicine provided the Hyperbaric Treatment Center was the talent, energy and background in academic diving medicine of Dr. Edward L. Beckman, Professor of Physiology. Dr. Beckman, an ex-Navy Captain, had been involved in diving and aerospace research throughout his entire career. To this day, the HTC utilizes treatment tables developed specifically for divers in Hawaii by Dr. Beckman. He was one of six (6) founding members of the Undersea Medical Society, now known as the Undersea & Hyperbaric Medical Society (UHMS). The UHMS is the professional society of clinicians and research scientists who work and study in the field of diving and hyperbaric medicine.

Dr. Beckman served as HTC's Medical Director and provided the Center with not only his expertise and clinical treatment skills but continued his research, experiments and studies. He established an interest group of faculty members, community physicians, Navy Medical Officers and the HTC Medical Staff named the Research Advisory Committee (later known as the Medical Advisory Committee). Through its quarterly meetings this group provided information on current diving medicine research and clinical cases presented to the HTC. The meeting provided the HTC medical staff experience in the academic and scientific environments. It was an impetus to bring the most talented, interested members of the community together. Dr. Beckman encouraged continually academic curiosity and high research standards.

Dr. Robert Overlock, HTC's current Medical Director, initiated a collaboration with JABSOM's Residency Program to provide all residents

an elective in hyperbaric medicine. This elective permits the residents to join the HTC's staff for one month to study the clinical aspects of diving accident management and hyperbaric oxygen therapy. Since diving is popular year around in Hawaii, the residents are exposed to divers who suffer from DCI. Without this elective, the residents are not likely to be exposed to any type of Hyperbaric Medicine. Many residents come from the mainland to train in an academic and clinical setting that would otherwise not be possible. Through this elective the residents utilize Problem Based Learning (PBL) format.

Dr. Overlock also provides a monthly Diving Medicine course geared mainly for emergency medicine residents and other medical professionals. This course includes an overview of physics, physiology, dive accident management and hyperbaric oxygen therapy (HBO) and provides an overview of how treatment can relieve the symptoms of DCI and how hyperbaric oxygen therapy can be an adjunctive therapy to many health problems. Hyperbaric oxygen therapy is generally approved for select medical indications including: carbon monoxide poisoning, acute smoke inhalation, crush injuries, compartment syndrome, exceptional blood loss, gas gangrene, chronic refractory osteomyelitis, radiation necrosis, prevention of compromised skin grafts, moderate or severe thermal burns and necrotizing fascitis.

Hyperbaric oxygen is 100% oxygen delivered at greater than atmospheric pressure. Except for its proven efficacy in treating DCI, HBO was not taken seriously as a treatment modality until the 1950's. It was then investigated for treatment of carbon monoxide poisoning, support of oxygenation during cardiac surgery, and treatment of anaerobic infections. Today HBO treatments are used as an adjunctive therapy for the various health problems noted above. The beneficial effects of HBO include: stimulating blood vessel growth, reducing edema, and improving the host response to fight infection. Routine HBO treatments last for a total of 2 hours and 8 minutes at a maximum depth of 47 feet. Currently, the HTC at Kuakini administers HBO treatments daily. The usual regimen for a patient is 30 to 60 treatments.

Dr. Overlock comments, "Our treatments work extremely well for the majority of patients referred to us. There are a few whose illness does not respond as well as we would like, but they are in the minority. The best way to find out if HBO treatments will work for an individual is to have your physician call us for a consultation."

DCS or what is commonly known as "the bends" afflicts a small percentage of divers but can be a life threatening illness. When breathing compressed air at depth, divers accumulate excess nitrogen in their body tissues. The normal air mixture is 80 percent nitrogen and 20 percent oxygen. When divers follow the dive tables there is not likely to be any ill effect from the nitrogen build up. Problems occur when safe diving recommendations are overlooked or the individual is predisposed to DCS. The build up of nitrogen produces millions of bubbles in the body's tissues upon ascent. As the diver reaches the surface these bubbles can cause pain and other symptoms. In the serious cases the bubbles can form in the brain or spinal cord and can result in paralysis or even death.

The HTC at Kuakini is the only facility of its kind which utilizes a maximum treatment depth of 280 feet. Through the center's own research, this prescription is suggested as more effective, and produces results more quickly than treatments at other centers. HTC meets the specific needs of Hawaii. Due to the popularity of diving in Hawaii, it is not simply an asset, but a necessity to the Islands. Services are available 24 hours a day seven days a week for any emergency DCS cases. Beyond the HTC's impact upon the Hawaiian Islands, the Center treats patients from the farthest reaches of the Pacific. HTC provides information to the Divers Alert Network (DAN), a national agency for divers, which studies DCS and symptoms to provide an increased knowledge base for all recreational, commercial and Navy divers.

The University of Hawaii JABSOM supports this effort with both the vital connection to talented, academic leaders and an avenue for an organizational structure for further development and provide an essential service to divers on the islands and throughout the Pacific Basin. In return the HTC represents the John A. Burns School of Medicine with a direct link to the community. It also continues the School of Medicine's research mission and serves as a unique and valuable training environment for residents.